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BIOLOGICAL EVALUATION
Western Spruce Budworm Infestation
On The Targhee, Bridger-Teton, And
Caribou National Forests
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INTRODUCTION

The western spruce budworm is probably the most serious defoliator of forest trees in the western United States. Long standing and variable budworm populations continue to defoliate Douglas-fir, subalpine fir, and to a lesser extent, Engelmann spruce, in portions of the Targhee and Caribou National Forests, Idaho, and the Bridger-Teton National Forest, Wyoming. Since the infestation is widely separated and occurs mainly on two National Forests--Targhee and Bridger-Teton--it will be discussed separately as the Targhee and Bridger-Teton infestations.

Targhee Infestation

Western spruce budworm activity was first reported in 1956 on the Dubois Ranger District at which time more than 19,000 acres were sprayed with DDT. Additional acreage was sprayed in 1957, but the outbreak gained momentum until 1963 when 200,000 acres were again aerially sprayed with DDT. The infestation began to recede and by 1969, no defoliation (other than that detected in the Snake River drainage on the Palisades Ranger District) was observed on the Targhee. Climatological conditions[1/] conducive to favorable budworm development caused a significant increase in budworm numbers during 1974 and 1975. Because of a late aerial reconnaissance in 1974, no defoliation was observed or mapped, but several areas of budworm activity were noted by Dubois Ranger District personnel. Table 1 shows a year-by-year record of budworm defoliation on all but the extreme southeast portion of the Targhee Forest since 1965.

Bridger-Teton Infestation

Of more recent origin than the Targhee outbreak, the Bridger-Teton infestation has been in progress since 1965. Since then, defoliation increased to more than 130,000 acres in 1968, dropped to a low level and by 1973 it was almost nonexistent. This respite was short-lived since both budworm populations and defoliated area took a sharp upswing during 1974 and 1975. A chronology of defoliated acreage from 1965 to the present is shown in Table 2.

1/ Biological Evaluation. Western Spruce Budworm Infestation Bridger-Teton - Targhee National Forests, 1974. 4 pp.

GENERAL INFORMATION

INSECT: Western spruce budworm, Choristoneura occidentalis Free.

HOST TREES: Douglas-fir, Pseudotsuga Menziesii
subalpine fir, Abies lasiocarpa
Engelmann spruce, Picea engelmanni

LOCATION: Targhee National Forest: south slope of the Centennial Mountains. Bridger-Teton National Forest: Upper Snake River and tributaries.

EXTENT OF INFESTATION: Targhee National Forest: south slope of Centennial Mountains north of Dubois; west of Henry's Lake; and north of Grand Canyon of Snake River. Bridger-Teton National Forest: Jackson, Wyoming, south to Blind Bull Creek, tributary of Greys River. Caribou National Forest: Williams Creek. (see attached maps)

FEATURES OF THE AREAS: Much of the infestation is inaccessible or in areas where travel is light or where defoliation is not readily visible. In other areas such as Jackson, Wyoming, Grand Canyon of the Snake River and Raynolds Pass, where moderate to heavy budworm populations are forecast for 1976, defoliation will be highly visible.

BIOLOGICAL INFORMATION

Visible defoliation during 1975 was detected and mapped by aerial observers during the last week in July (Targhee) and first week in September (Bridger-Teton).

On-the-ground larval surveys were conducted in late July followed by egg mass evaluation collections during late August (Targhee) and mid-September (Bridger-Teton). The Targhee collection was conducted prematurely because some moths were still in flight and oviposition was not complete. This late moth flight was caused by the prolonged cool, moist weather during May and June which resulted in slow insect development. Because of the intensity of the survey and other priorities, there was no choice but to continue the survey even though it was premature. The egg mass counts for the Targhee infestation, therefore, are conservative and somewhat less than what would have occurred if sampling was delayed two or three weeks.

The number of new egg masses indicated within a reasonable range (barring an unforseen natural population collapse) the degree of defoliation that can be expected in 1976. Forty-two evaluation plots (28, Targhee; 14, Bridger-Teton) were established in or near known defoliated areas (see maps). A collection consists of two 30-inch midcrown branches from

opposite quadrants of five co-dominant Douglas-firs. The branches were carefully removed with telescopic pole pruners, labelled, placed in individual cloth sacks, and brought to the laboratory in Ogden. The unhatched egg masses (some from the Targhee) and those freshly emerged were then separated from the old masses by microscopic examination, and counted. Tables 3 and 4 show the numbers of egg masses, the level of defoliation that can be expected in 1976, and where applicable, trend.

These data portend a sizeable increase in defoliation intensity but only a slight increase in extent of infestation during 1976. Unusually heavy egg deposition has occurred in the Pleasant Valley and Henry's Lake areas of the Targhee Forest and throughout most of the Bridger-Teton infestation. If natural control factors do not intervene, these areas will experience moderate to heavy defoliation in 1976.

DISCUSSION

The Bridger-Teton infestation has provided us with an ideal and unique opportunity for monitoring the year-by-year course of a western spruce budworm infestation under completely natural conditions. It is ideal in that it is of fairly recent origin (1965) and has undergone abrupt population changes; it is unique because it has never been sprayed with chemicals. Most of the other western spruce budworm infestations in the Region, including the one on the Targhee, have been sprayed at one time or another. Treatment confounds attempts at damage appraisal and one is never sure whether (1) damage was alleviated by treatment or (2) the budworm population would have declined naturally in the absence of treatment.

Impact surveys to record budworm damage were conducted in the Greys River area during 1971. Following seven years of defoliation, no widespread or significant damage was apparent. Damage was confined to local areas and included mortality of suppressed understory, top kill and growth reduction[2/]. In other areas of past budworm activity, once budworm feeding decreases, tree growth resumes[3/].

Areas that appear to have experienced the heaviest damage are Roos, Pine and Porcupine Creeks. These and other areas that may have incurred additional damage since 1971, will be examined closely in 1976.

It is unlikely that the defoliated areas in the Targhee infestation have yet to experience significant damage. On October 3, Targhee Staff

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2/ Biological Evaluation. Western Spruce Budworm Infestation on the Bridger, Teton, Targhee, and Caribou National Forests, 1972. 4 pp.

3/ Status of Forest Insect and Disease Conditions and Programs in the Intermountain Region, 1972. 12 pp Illus.

Forester, Marvin Wolfe; R-4 Timber Management Staff Forester, Max Fee; and entomologist, William Klein, examined several heavily defoliated Douglas-fir trees in the Raynolds Pass area (Figure 1). Midcrown branches were removed and radial increment cores were taken from the trees. Although much of the 1975 growth was removed from the apical portion of the branches, the twigs were green and all lateral and adventitious buds were set and alive. Also, no reduction in radial growth was observed, although this may not show up until the trees have undergone two to three years of defoliation.

RECOMMENDATIONS

A damage appraisal survey will be conducted in both infestations during 1976. At this stage of the infestations, the potential for additional damage in localized areas is high, but the damage is not expected to be serious enough to warrant control. Control can only be accomplished by aerial spraying, and depending upon the size of area sprayed, costs would run approximately $8-$10 per acre. Control is not recommended at this time.

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Table 1. AREAS OF WESTERN SPRUCE BUDWORM DEFOLIATION DURING AN 11 YEAR PERIOD, TARGHEE INFESTATION

YEAR	DEFOLIATION INTENSITY (IN ACRES) LIGHT	MEDIUM	HEAVY	TOTAL
1965	46,100	42,600	9,200	97,900
1966	14,600	--	--	14,600
1967[1/]	6,300	3,700	--	10,000
1968	4,260	9,680	2,960	16,900
1969-74	--	--	--	--
1975	24,500	8,000	--	32,500

1/ From 1967 through 1975, visible defoliation detected in the southern end of the Palisades (formerly Swan Valley) Ranger District is included in the Bridger-Teton summary.

Table 2. AREAS OF WESTERN SPRUCE BUDWORM DEFOLIATION DURING AN 11 YEAR PERIOD, BRIDGER-TETON INFESTATION

YEAR	FORESTS[1/]	DEFOLIATION INTENSITY (IN ACRES) LIGHT	MEDIUM	HEAVY	TOTAL
1965	BT	10,000	--	--	10,000
1966	BT	33,000	800	--	33,800
1967[2/]	BT,Ta	25,800	34,400	1,600	61,800
1968	BT,Ta,C	51,600	68,800	12,400	132,800
1969	BT,Ta,C	79,900	3,200	--	83,100
1970	BT,Ta,C	70,700	10,200	--	80,900
1971	BT,Ta,C	13,600	16,600	10,300	40,500
1972	BT,Ta,C	35,500	29,100	2,000	66,600
1973	BT,Ta,C	--	--	--	--
1974	BT,Ta	18,300	2,100	--	20,400
1975	BT,Ta,C	62,500	56,800	4,600	123,900

1/ BT, Bridger-Teton; Ta, Targhee; C, Caribou National Forests

2/ Includes that visible defoliation detected in the southern end of the Palisades (formerly Swan Valley) Ranger District, Targhee National Forest.

Table 3. WESTERN SPRUCE BUDWORM EGG MASS COUNTS AND ESTIMATES OF DEFOLIATION AND POPULATION TREND DURING 1976, TARGHEE INFESTATION

AREA	PLOT LOCATION	NO. EGG MASSES PER PLOT		PREDICTED DEFOLIATION FOR 1976		TREND
		1974 1/	1975	PERCENT	CLASS	
1	White Pine Cyn.	--	123	56-100	Heavy	--
2	Pleasant Valley Cr.	--	235	56-100	Heavy	--
3	Picnic Hollow	--	97	56-100	Heavy	--
4	Stoddard Cr.	--	117	56-100	Heavy	--
5	Van Noy Cyn.	--	136	56-100	Heavy	--
6	Dairy Creek	--	45	56-100	Heavy	--
7	Porcupine Pass	--	42	56-100	Heavy	--
8	Petes Creek	--	28	41-55	Medium	--
9	Three Mile Cr.	--	4	26-40	Light	--
10	Corral Cr.	--	6	26-40	Light	--
11	McGarry Cyn.	--	3	0-25	Very Light	--
12	Saw Cr.	--	2	0-25	Very Light	--
13	Little Creek	--	1	0-25	Very Light	--
14	West Dry Cr.	--	1	0-25	Very Light	--
15	Taylor Cr.	--	0	0-25	Negligible	--
16	Keg Cr.	--	0	0-25	Negligible	--
17	Willow Cr.	--	0	0-25	Negligible	--
18	Dry Cr.	--	1	0-25	Very Light	--
19	Blue Cr.	--	4	26-40	Light	--
20	N. E. Miners Cr.	--	7	26-40	Light	--
21	Red Rock Road	--	15	41-55	Medium	--
22	Kelly Creek	--	59	56-100	Heavy	--
23	Timber Creek	--	126	56-100	Heavy	--
24	Raynolds Pass	--	147	56-100	Heavy	--
25	Twin Cr.	--	5	26-40	Light	--
26	Dry Fork	--	5	26-40	Light	--
27	Lower Targhee Cr.	--	9	26-40	Light	--
28	Upper Targhee Cr.	--	5	26-40	Light	--

1/ No collections were made in 1974.

Table 4. WESTERN SPRUCE BUDWORM EGG MASS COUNTS AND ESTIMATES OF DEFOLIATION AND POPULATION TREND DURING 1976, BRIDGER-TETON INFESTATION

AREA	PLOT LOCATION	NO. EGG MASSES PER PLOT		PREDICTED DEFOLIATION FOR 1976		TREND
		1974	1975	PERCENT	CLASS	
1	Cache Cr.	38	201 (137)	56-100	Heavy	Increasing
2	Lower Cache Cr.	--	83 (87)	56-100	Heavy	--
3	Radio Point	128	152 (78)	56-100	Heavy	Increasing
4	Snow King	87	74 (52)	56-100	Heavy	Decreasing
5	Lower Leeks Cyn.	--	32 52	41-55	Medium	--
6	Upper Leeks Cyn.	--	298 139	56-100	Heavy	--
7	Horse Creek	68	43 132	56-100	Heavy	Decreasing
8	Fall Creek	62	110 78	56-100	Heavy	Increasing
9	Astoria Hot Spgs.	--	46 100	56-100	Heavy	--
10	Roos Creek	69	182 105	56-100	Heavy	Increasing
11	Higby Creek	9	101 70	56-100	Heavy	Increasing
12	Squaw Creek	10	56 108	56-100	Heavy	Increasing
13	Bull Hollow	--	210 58	56-100	Heavy	--
14	Porcupine Cr.	149	196 99	56-100	Heavy	Increasing

Figure 1. Douglas-fir stand near Raynolds Pass (Targhee National Forest) defoliated by the western spruce budworm.